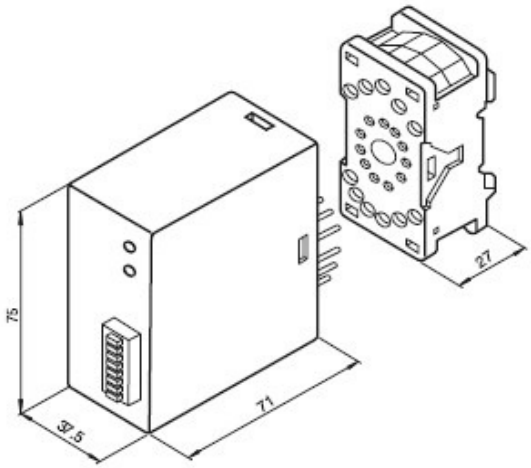
LC10 LOOP DETECTOR

Installation Manual

Quantek Systems Ltd, 59A Sheffield Rd, Dronfield, S18 2GF, UK
Tel: 01246417113 **Email** sales@quantek.co.uk

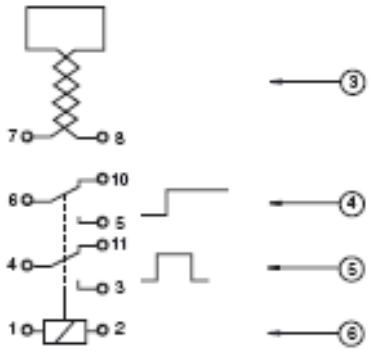
Security Instructions:

- Read the operating instructions before attempting commissioning
- Installation, connection and adjustments should only be undertaken by specialist personnel
- No safety component for protection of personnel or EMERGENCY-STOP functions.



Technical data

General specifications	
Marking	CE
Operating mode	Pulsed and continuous signal
Indicators/operating means	
Operating elements	DIP-switch
Switching state	LED
Electrical specifications	
Operating voltage U_B	230 V AC (electrically isolated from loop)
Ripple	-15 %/+10 %
Power consumption P_0	1.6 VA
Settling time	2 s
Loop inductivity	100 ... 1000 µH
Loop frequency	20 ... 120 kHz
Input	
Number of channels	1
Output	
Switching voltage	250 V AC
Switching current	6 A
Output type	relay
Pulse length	period or 800 ms Pulse
Response time	100 ms
Ambient conditions	
Ambient temperature	-20 ... 70 °C (253 ... 343 K)
Storage temperature	-40 ... 70 °C (233 ... 343 K)
Mechanical specifications	
Protection degree	IP30
Connection	Plug socket ; 11-pin Terminal connection ≤ 1.5 mm^2



LC10 Loop Detector
Installation

Connection:

Number	Explanation	Connector terminals
3	Loop connection	7/8
4	Signal output, maintained contact	5/6 = NO 6/10 = NC
5	signal output, pulse contact	3/4 = NO 4/11 = NC
6	Operating voltage	1/2

Settings:

Sensitivity:

The response sensitivity of the loop detector can be set in three stages by switches 3 and 4.

Switch 3	Switch 4	Sensitivity
OFF	ON	low
ON	OFF	medium
ON	ON	high

In the switch position "OFF", "OFF" the loop evaluation is switched off.

Frequency switches:

The loop frequency can be set in four stages using the switches 1 and 2.

Switch 1	Switch 2	Frequency
OFF	OFF	Basic frequency f
ON	OFF	f - 10 %
OFF	ON	f - 15 %
ON	ON	f - 20 %

After actuation of the frequency switches 1 and 2 the loop must be readjusted with switches 3 and 4 set to "OFF", "OFF".

Operating mode switches:

The following operating modes can be set with switches 5 and 6:

Switch 5	Switch 6	Result
OFF	-	Pulse (0,8 s)when loop is allocated
ON	-	Pulse (0,8 s) when loop is abandoned
-	ON	Increased sensitivity (Boost)

The increased sensitivity (Boost) is used for the detection of vehicles with high body assemblies, e.g. HGVs.

Automatic adjustment:

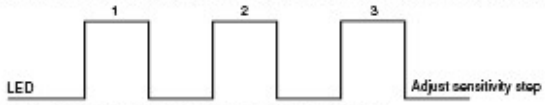
When the operating voltage is applied to the device automatic adjustment with the loop takes place. The output relays are switched in the switch position "Loop not allocated". The adjustment takes 2 s, the device is then ready for operation.
Automatic adjustment also takes place when both sensitivity switches 3 and 4 are set to "OFF" and then set to another switch position.

Indications:

LED 2 signals the allocation state of the loop (Loop allocated = LED On). A fault in the loop due to a short-circuit or lead breakage and loop inductance outside the permissible range is indicated by flashing of LED 2.

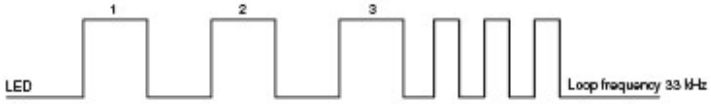
Test function:

The loop detector is provided with an integrated test function, which enables the loop frequency and sensitivity to be optimally set without additional devices or instrumentation.
Indication of the recommended sensitivity:
The vehicle must be driven onto the loop. The loop detector measures and stores the frequency change. When switches 3 and 4 are changed over the recommended sensitivity is indicated by flashing of the LED.



Measurement of the loop frequency:

The loop frequency can be measured via the LED. Set switches 3 and 4 from "OFF" to "ON". The LED indicates the loop frequency via a signal sequence:



Loop fault:

In the event of lead breakage or short-circuit the LED flashes continuously and the switch contact reverts to the "Loop allocated" state.

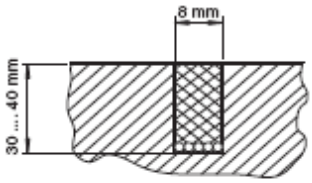
1 Laying loops

1.1 Laying loops in asphalt or concrete floors

When laying loops in asphalt or concrete floors the loop can be produced in commercial grade insulated copper braid HO7V-K1.5(NYAF) with a cross section of 1.5 mm².

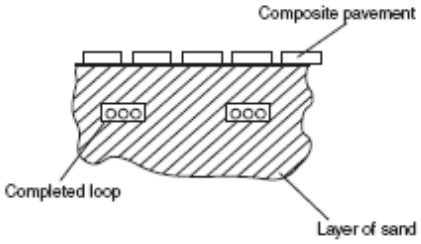
A groove approx. 8 mm wide and 30 - 40 mm deep is cut into the floor. The groove must be cleared of all residue and the wires of the loop inserted as deep as possible and fixed in place. The groove is then refilled with artificial resin or bitumen.

The connection lead for the loop is twisted (at least 20 times per meter) and then also laid in a groove or a conduit to the loop detector. The connection lead should not exceed a length of max. 150 m.



1.2 Laying loops under composite paving

When laying loops under composite paving the loop must be laid permanently in a plastic pipe in a sand bed. We recommend to lay the loops in a plastic conduit. The loop must not be laid in groove cut into the composite paving.

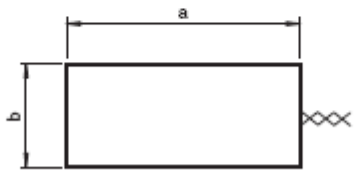


2 Number of loop windings

The induction loop consists of several copper wire windings which are inserted into the floor groove.

The number of windings depends on the size of the loop and can be calculated from the loop circumference in accordance with the following table.

Loop circumference U: U=2a+2b



e.g.: a = 3 m; b = 1 m; U = 2 x 3 m + 2 x 1 m = 8 m; Number of windings = 4

Loop circumference	Number of windings
2 - 4 meters	6
4 - 7 meters	5
8 - 12 meters	4
13 - 25 meters	3

Adjacent loops of the same circumference should differ from each other by 1 winding. This prevents the loops from operating on the same frequency.

3 Loop test

After laying and sealing the insulating resistance of the loop must be measured against earth. It must be at least 1 MOhm.

3.1 Important notice!

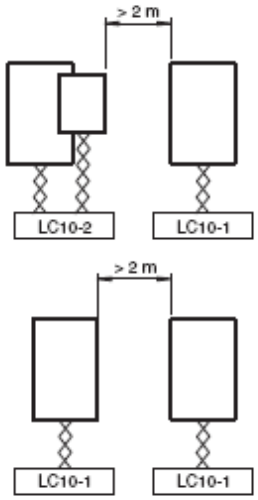
1. When laying in asphalt/concrete the loop must be buried deep enough not to be pressed back out under driving load.
2. Twist the loop connection lead well (at least 20 times per meter) and lay permanently.
3. Firmly embed the loop and the connection lead. Loop movements can result in false alarms.
4. Solder the connection points in the loop connection lead and insulate them well (e.g. distribution box + sealing)
5. Lay loop connection lead separately from high voltage cables.
6. Lead the connection lead also twisted in the switch cabinet up to the terminals of the loop detector.
7. Do not lead loops over resistance mats of floor heating installations.

4 Loop interference

4.1 Interference from adjacent loops

Loops connected to different loop detectors must have a minimum distance of 2 meters from each other and operate on different frequencies.

For loops connected to a double detector this minimum distance can be reduced. However, it must be ensured that the two loops do not operate on the same frequency.



4.2 Interference from metal

Fixed metal constructions e.g. steel girders, drains, steel reinforcements are integrated in the automatic compensation of the loop detector and do not affect the safe functioning except for a reduced sensitivity.

Moveable metal constructions e.g. rolling doors and revolving doors must have a sufficiently large distance to the loop (> 1 meter) to prevent triggering the loop detector when moving.

5 Influencing variables

5.1 Loop inductivity

The recommended number of windings is only dimensioned for a loop inductivity of approx. 200 µH. At this loop inductivity no significant reduction of sensitivity results from a connection lead of up to 50 meters. For longer connection leads (up to max. 150 m) the loop inductivity should be increased by increasing the number of windings.

5.2 Loop resistance

The total resistance of loop connection leads and contact resistances should not exceed 5 Ohm. The cross section of the loop connection lead should be 1.5 mm².

5.3 Steel reinforcements

Steel reinforcements in the floor reduce the loop sensitivity. With heavy reinforcements the loop size should be adjusted optimally to the vehicle size (no large loops) in order to keep the loss of sensitivity low.

5.4 Laying loops

The loops must be permanently laid in the floor to prevent malfunctioning due to mechanical movement. Especially when laying between rail tracks a firm installation and the use of a stable complete loop should be ensured.

5.5 Connecting loops in series

Connecting loops in series (e.g. opening loops on the inside and outside of gates) considerably reduces the sensitivity (approx. 30 - 50 %). In such cases we recommend the use of the two-channel loop detector LC10-2.

5.6 Insulation resistance

Insufficient insulation resistance of the loop to earth, to adjacent loops or of the windings to each other can cause malfunctioning. When laying loops it must be ensured that the line insulation is not damaged by sharp edges in the floor groove.

6 Installation / connection

6.1 Installation

The loop detectors are constructed within the 11-pole plug-in socket housing and can be installed directly in switch cabinets. They can be fixed either on a 35 mm top hat rail or via screw connections. Direct installation at the induction loop on location is also possible through integration in an ISO housing. This method of installation is recommended for long loop connection leads.

During switch cabinet installation care must be taken not to install the loop detectors directly next to switch contactors for high voltage consumers in order to prevent interference.

6.2 Connection

Loop detectors are control devices which are fully ready for operation without the need for additional equipment when connected to the supply voltage and the induction loop. The switching outputs are relay contacts with high breaking capacity which can directly trigger contactors, valves and alternate current motors.

To reduce potential interference it is recommended to fit inductive consumers with R/C protective circuits (47 Ohm / 0.1 µF).

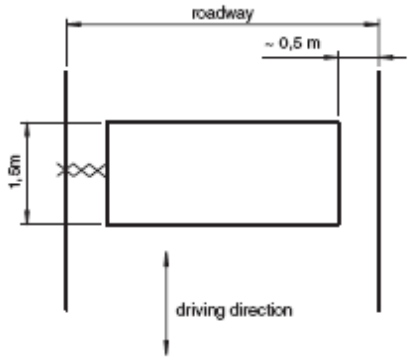
The loop connection lead must be well twisted (at least 20 times per meter) all the way to the connection terminals of the loop detector. The loop connection lead must be laid separately from switching cables of high voltage consumers (not in the same cable conduit).

The proper design and correct laying of the loop are preconditions for the proper functioning of the loop detector.

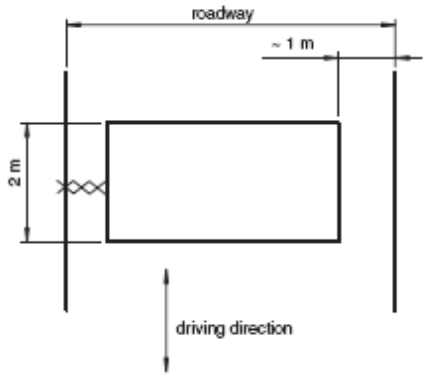
7 Loop geometry

The size and shape of the loop are determined by the respective application. Generally, the maximum sensitivity of the induction loop is achieved if the loop is no larger than the vehicle to be detected. This principle must in particular be observed if the sensitivity is reduced by steel reinforcements within the floor.

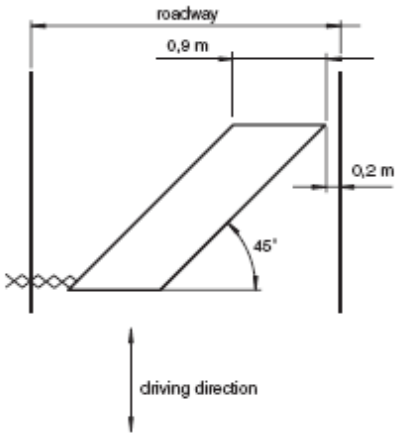
7.1 Detection of cars and forklift trucks



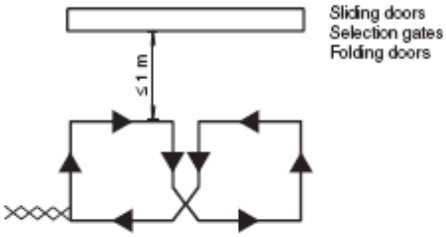
7.2 Detection of trucks



7.3 Detection of two-wheelers (motorcycle, bicycle)



7.4 Loops with reduced lateral sensitivity



Loops laid in this design have a reduced lateral sensitivity and should be used when sliding, selection or folding doors are in close proximity to the loop (minimum distance >= 1 m)